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ABSTRACT

The purpose of this study was to evaluate the design and implementation of 10 neuropathology interactive videodisc instructional (IVI) modules used by Michigan State University undergraduate medical students in the College of Osteopathic Medicine and the College of Human Medicine. The modules were developed by Michigan State University personnel in HyperCard for Macintosh computers. The evaluation strategy incorporated a mixed method approach using qualitative and quantitative data to examine levels of student acceptance for the modules; ways in which IVI modules accommodate different learner styles; and to what extent the modules facilitate the attainment of higher level learning objectives. Students rated the units highly for learning effectiveness; many students reported group interaction as beneficial; and students expressed a desire for more IVI in the curriculum. The paper concludes with recommendations for future use of interactive videodisc technology in the teaching/learning process. (13 references) (Author)

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Evaluation of Videodisc Modules: A Mixed Method Approach

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Abstract

The purpose of this study was to evaluate the design and implementation of 10 neuropathology interactive videodisc instructional (IVI) modules used by Michigan State University medical students in the College of Osteopathic Medicine and the College of Human Medicine. The evaluation strategy incorporated a mixed method approach using qualitative and quantitative data to examine levels of student acceptance for the modules; ways in which IVI modules accommodate different learner styles; and to what extent the modules facilitate the attainment of higher level learning objectives. Students rated the units highly for learning effectiveness; many students reported group interaction as beneficial; and students expressed a desire for more IVI in the curriculum. The paper concludes with recommendations for future use of interactive videodisc technology in the teaching/learning process.

Introduction

The 1984 report issued by the Panel on the General Professional Education of the Physician and College Preparation for Medicine (GPEP) challenged medical educators to make substantive changes in both content and delivery of medical school curricula.[1] Especially relevant to this study is the GPEP recommendation that medical educators implement alternative teaching methods so as to reduce students' reliance on lectures as a primary source for information.[2] Also relevant are report recommendations that medical schools and faculty: (1) adopt teaching methods for students who have the ability to learn independently and provide opportunities for further development of this skill; (2) reduce passive learning and require students to be active, independent learners and problem solvers; and, (3) promote the effective use and application of information science and computer technology.[3] The MSU Colleges of Osteopathic and Human Medicine have instituted a curricular revision process to incorporate the GPEP recommendations.

A partial answer to successful implementation of the GPEP recommendations has reportedly been found in the instructional application of computer based interactive videodisc technology.[4][5] Authors Xakellis and Gjerde state that: "Computer aided instruction is currently viewed by many as one approach to meeting this educational need" for increasing problem solving and self study skills.[6] Among medical subjects that have used interactive videodisc instruction (IVI) in instructional programs are anatomy, radiology, pathology, and psychiatry.[4],[7],[8] In this study, interactive videodisc units were an integral part of preclinical neuropathology instruction.

Interactive videodisc instruction, as defined here, is the use of a computer based instructional program that accesses visual images stored on a videodisc in an order controlled by the learner. A programmed computer accesses different sections of the videodisc or instructional text, depending on the viewer's response to various alternatives. This instructional delivery strategy provides individualized, self paced content information accompanied by instantaneous feedback. Since the medium is inherently visual, it is especially well suited to any discipline requiring motion, animation, pictures, or other visual stimuli to facilitate the learning process. Michigan State University personnel developed the IVI neuropathology modules in HyperCard for Macintosh computers using images from the "Slice of Life" videodisc (a generic videodisc distributed by the University of Utah).[9] These modules were used by undergraduate medical students in the Michigan State University College of Osteopathic Medicine (MSU/COM) and College of Human Medicine (MSU/CHM).

This study incorporates elements of field based, ethnographic and other qualitative evaluation strategies with traditional quantitative methods. These multiple methods were implemented in an attempt to generate a body of relevant learner response criteria that might be applicable to other technology based learning settings. The evaluation strategy was a conscious attempt to, as Hagler suggests, "move to studies of instruction and learners, not media."[10] The evaluation process was patterned on what Patton describes as the "qualitative-naturalistic-formative approach...especially appropriate for programs that are developing, innovative, or changing, where the focus is on program improvement, facilitating more effective implementation, and exploring a variety of effects on participants."[11] This research process seeks to address the limitations and inadequacies inherent in research and evaluation studies which use experimental and quasi experimental designs to compare interactive videodisc technology with other instructional delivery systems or "traditional instruction," often with inconclusive results.[12],[13]

Because a qualitative inquiry approach was included, some data gathering strategies were generated by the evaluation process itself. For example, early results from online quantitative evaluation data allowed the implementation team to synthesize a series of questions for focus group interviews. Both focus group interviews and online data lead to three major questions for the implementation team: (1) What are the levels of student acceptance for the implemented IVI materials?; (2) Did the IVI modules accommodate different learner styles?; and (3) To what extent do IVI modules facilitate the attainment of

higher level course objectives? These questions will be addressed in the Discussion section of this paper.

Method

IVI Implementation - Interactive videodisc instructional modules were developed on 10 neuropathology topics: neurocytology/ cytopathology, degenerative disorders, increased intracranial pressure, inflammatory diseases, slow virus diseases, neoplasms, traumatic disorders, cerebrovascular disorders, developmental disorders, and toxic/ metabolic/nutritional disorders. Each IVI module consists of: a five question pretest with an indication of correct and incorrect responses; an instructional lesson with related review questions covering the content required for examinations; a posttest with content feedback for each answer; case studies designed to reinforce concepts presented elsewhere and support problem solving strategies related to neuroanatomy, neuropathology and neurology; and a glossary accessed from the lesson or case study, or used separately. A randomly accessible table of contents (index) is available in the lesson to permit student control over lesson sequencing. A "comments" field is provided for students to leave notes to the instructor or instructional designers. An electronic mail system is being tested to expedite student-instructor dialogue regarding questions as they arise.

There are three curricular formats in the two medical schools at Michigan State University and the neuropathology IVI modules were implemented according to the nature of each curriculum. Described below are the three types of curricula and modes of implementation.

1. The College of Osteopathic Medicine teaches neuropathology within a systems curriculum. The IVI neuropathology modules were utilized two ways in different years.

- During Fall 1989, 118 third year students enrolled in the neuroscience system course were awarded extra credit points (one per module) for viewing and evaluating the eight IVI modules then available. The modules included: neurocytology/cytopathology; degenerative disorders; increased intracranial pressure; inflammatory diseases; slow virus diseases; neoplasms; traumatic disorders; and cerebrovascular disorders. During Fall 1990, a more extensive evaluation and tracking system was available. The 112 third year students enrolled in the neuroscience system course were required to view three IVI modules: neoplasms; cerebrovascular disorders; and a student selected module. Computer use was monitored for required modules. The remaining IVI modules were recommended, but use was elective.

2. The College of Human Medicine uses a two track curriculum:

- Students in Track I are taught in discipline based courses. During Spring 1990, 68 second year students enrolled in the neuropathology course were required to view four IVI modules (neoplasms; cerebrovascular disorders; trauma; inflammatory disorders) with computer use monitored. The remaining IVI modules were recommended, but use was elective. Lectures and written class materials were also available, as in previous years.

- Students in Track II are taught in a problem based, independent study curriculum where "focal problems" organize basic science content. During Spring 1990, 42 first year students were enrolled in the "Impaired Consciousness" focal problem where the primary content is neuroscience. The following IVI modules were on the list of required course materials: neoplasms; cerebrovascular disorders; inflammatory disorders; trauma; and increased intracranial pressure. However, computer use was elective.

The data, therefore, span the period from Fall 1989 to Fall 1990 and incorporate information about 340 MSU medical students enrolled in three curricular formats.

Two on-line questionnaires - a module-specific evaluation and a student information form - were used to collect initial quantitative data. A computerized student tracking system provided important support data to more fully analyze usage, time spent in the module components, and levels of acceptance for the IVI course materials.

IVI Module-Specific Evaluation - Questions presented after each module assessed the effectiveness of various instructional attributes of each module component; e.g., lesson, case study, posttest questions, and glossary. An open comments field was available to record student comments about other features of the module not included above.

Student Information Form - A student information form collected data about prior computer experience, effectiveness of group versus individual use, optimal group size, appeal of overall design features, and the preferred role of computer instruction in the medical school curriculum.

Student Tracking System - A computerized student tracking system collected data about the amount of time spent in each individual module component by each student, module-specific pretest and posttest scores for correct first responses, and the group size for the reported session.

Focus Groups - During the term the course was offered to CHM students, focus groups were organized. Both Track I and Track II students were invited; however, due to schedule constraints, Track II students did not participate. There were 5 to 10 Track I students in each of three focus group sessions. To encourage voluntary participation, each meeting was scheduled at noon with lunch provided. The session format included a brief explanation of the background and rationale for developing the IVI modules,

orientation to the purpose of the focus group, and a description of the evaluation study prior to discussion of the interview guide questions. The interview guide explored the following areas: hardware, utility of the IVI modules to help students achieve levels of mastery, appropriateness of module content, organizational factors, motivational factors, and self-testing components within the module.

Results

Data from the Module-Specific Evaluation Form - Table 1 presents a summary of the data obtained for selected questions from the on-line evaluation forms for all students. Each of the 340 students had an opportunity to fill out evaluation forms on from five to ten modules, depending on their curricular format. A total of 547 forms were analyzed; however, not all questions were answered. The total number of responses for each question is indicated in the table. Bartlett's Test for Homogeneity of Variance across the three curricular formats indicates no significant differences in response variability among the groups (p=.60). The three groups were: (1) COM 1990 students; (2) CHM Track I students; and (3) CHM Track II students. Therefore, responses were pooled for each question.

Table 1. Results on Module-Specific Evaluation Forms

Statement	n[1]	Mean[2]	% A/SA	% D/SD
LESSON:				
This unit helped me learn the material.	542	3.44	100	0
The content presented was too easy.	535	1.95	8	92
The inclusion of videodisc images was valuable.	538	3.45	98	2
More videodisc images should be presented.	534	3.09	80	20
The review questions did not help and should be deleted.	533	1.55	3	97
The computer diagrams helped to illustrate concepts.	527	3.29	98	2
I would recommend this section to others.	534	3.45	99	1
CASE STUDY:				
The case study challenged me to think about clinical/pathological problem solving.	480	3.35	96	4
The questions/feedback effectively reinforced neuroanatomy and neuropathology.	516	3.38	98	2
There should be more case studies on this topic.	478	2.81	69	31
I would recommend this section to others.	511	3.36	98	2
POSTTEST:				
The explanations in the posttest helped to reinforce the main concepts.	516	3.44	98	2
The questions were too easy.	521	2.07	18	82
GLOSSARY:				
The glossary was NOT a useful feature.	451	2.23	26	74

[1] Number of responses to each question.

[2] Mean of responses where 1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree

Results indicate that students rated all aspects of the modules as very valuable in helping master the material, including content, images, diagrams, glossary, and review questions. In addition, many of the open ended comments written by students were extremely positive and emphasized the value and effectiveness of the IVI modules in helping them master course content.

Data from the Student Information Form - Completion of this form was totally optional. Although the sample was relatively small (n=47) and self selected, the researchers believe that the opinions expressed were important for planning and future program development. Results indicate a fairly even distribution in previous computer experience, ranging from no previous experience to experienced users. The majority of students (66%) reporting prior experience had used a Macintosh computer. A majority of students (72%) who used the modules in small group study (two to three students) stated that interaction was beneficial. In response to a question about optimal study group size, 49% stated that two was optimal; and 36% said three was optimal. The remaining students, only 15%, preferred more than three in a study group. Most students (91%) liked the option of leaving a comment and 87% requested an on-line mechanism to obtain timely answers to their questions from the instructor. Responding to the statement, "Computer instruction is best suited for replacing lectures for some material," 67% of the students agreed and 33% disagreed. Students said they would prefer to spend more time using computer based instruction (CBI) than they are currently spending (e.g., 38% are currently spending three hours or more per week; 72% said they would prefer to use CBI three hours or more per week). When asked about additional features, more students requested an expansion of the case study section than any of the other parts.

Data from the Computerized Student Tracking System - Table 2 provides a summary of the tracking data important for the analysis of IVI module usage. Data were recorded for each individual student, whether working individually or in a small group. The different modes of implementation provide the opportunity to analyze student use in different ways so student tracking data were recorded

separately for each curricular format and mode of implementation. For all curricular formats, students using the modules spent enough time to master the material in both the lesson and case study. There was no substantial difference in the time spent in each section based on whether use was required or not required; the amount of content appeared to be the major factor in determining average time spent.

(Insert Table 2 about here)

- For Track I students (**discipline-based curriculum**), four modules were required. Analysis of the number of students logged on to optional modules indicates that many students (about half of those enrolled) used non-required IVI modules, although the content was also covered in lecture and written course materials.

- For Track II students (**problem-based curriculum**), content in five of the modules was included in the exam, but use of the computer was not required. Student tracking data indicate that a majority of students did use the IVI modules. For modules with the major neuropathology content, Track II students spent more time in the lesson than Track I students. Since Track II students have less opportunity to see examples of visual images of neuropathology lesions presented, the increased time in the lesson may be attributed to the increased time students spent interacting with the visual material.

- For College of Osteopathic Medicine students in the neuroscience system during Fall of 1989, a total of 798 extra credit points were awarded to the 118 students enrolled (85% of the total possible points available for this activity). Eighty-seven students (74%) completed all eight modules available at that time and only nine students did not use any of the modules. Although students did not have to complete the Case Study to receive extra credit points, about half of the students used this section.

- For College of Osteopathic Medicine students in the neuroscience system during Fall 1990, students were required to complete three IVI modules: cerebrovascular disorders; neoplasms; and one more of their choice. About one third of the students used the non-required modules.

Data from the Student Focus Group Sessions - The following six points summarize the three focus group sessions:

1. Hardware: Most students stated that the equipment was reasonably easy to use. Levels of computer literacy varied greatly; however, lack of familiarity with hardware did not seem to be an inhibiting factor in students' perceived comfort with the computers.

2. Utility of the IVI modules to help students achieve levels of mastery: A majority of students remarked that the modules were best suited for acquiring basic concepts and principles, and practicing with case studies. Several students recommended that the course be structured to make the modules required prior to attending lecture. Assuming that students used the modules to understand the basics, lectures could then be used for higher order learning, such as integration, clinical correlations, and problem solving. In this way, lecture time could be spent going beyond the module acquired basics to discussion of application of the basic content.

3. Content and design of the computer based modules: Helpful features specifically mentioned included the glossary and the visual ability to compare normal and abnormal images. Recommendations for improvement included providing text references with the feedback for the sample test questions and tying the neuropathology IVI module content to previously learned neuroanatomy course material.

4. Organizational factors: Several students commented on the excellent organization of the IVI teaching modules and how well they fit into the overall course. For example, students said they liked the reference points provided throughout a given module, signaling how far along they were in the lesson, e.g., card 15 of 75. Students expressed appreciation for the variety and diversity in case studies and the parallel between the IVI modules and the course syllabus. Students preferred units completed in one sitting and judged certain modules to be too long.

5. Motivational factors: Several students mentioned that requiring completion of certain modules was an effective strategy, since it introduced students to the computer based modules. The majority of focus group participants indicated that they went on to complete more than the required modules because they judged them to be useful and fun. Without the requirement, students speculated that many would not have tried the IVI modules at all. Some students commented that they were motivated by the novelty of using computer based instruction as an alternative to traditional learning methods.

6. Self examination: Students commented frequently and spontaneously on the evaluation aspects of the modules and on the pretests and posttests in particular. They liked the idea of the self-tests but had several suggestions for improvement. Among the most frequent suggestions were: increase the number and frequency of test questions throughout the lesson and make the questions more challenging (e.g., more synthesis or analysis level questions).

Table 2

Student Tracking Data

Module	CHM Track I				CHM Track II				COM 1989				COM 1990			
	n		minutes /student		n		minutes /student		n		minutes /student		n		minutes /student	
	L	C	L	C	L	C	L	C	L	C	L	C	L	C	L	C
# * Cerebrovascular	32	29	53	22	21	14	65	25	76	40	55	15	69	50	60	30
# * Neoplasms	47	40	65	21	20	11	71	20	68	35	51	23	67	51	80	20
* Trauma	55	44	45	13	20	16	56	25	85	45	39	11	34	11	44	11
* Inflammatory	22	21	51	22	16	12	63	16	85	33	42	8	26	16	45	16
Increased ICP	16	12	34	13	19	13	56	13	84	41	26	19	11	8	51	12
Cytopathology	19	NA	33	NA	NA	NA	NA	NA	56	NA	25	NA	21	NA	29	NA
Degenerative	34	31	56	7	NA	NA	NA	NA	95	54	33	6	25	13	44	11
Developmental	38	35	63	9	NA	NA	NA	NA	NA	NA	NA	NA	22	7	45	4
Slow Virus	21	20	20	6	NA	NA	NA	NA	92	51	25	5	39	20	17	7
Toxic-Met-Nutr	30	22	49	14	NA	NA	NA	NA	NA	NA	NA	NA	25	7	38	11

Required for COM
* Required for Track I

L = Lesson C = Case Study NA = Not Applicable

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Discussion

Data emerging from the various evaluation methodologies support a high level of student acceptance for the implemented IVI materials. Student tracking data suggest that students took the time in each module to cover the material and explore various module alternatives rather than doing the minimum needed to receive credit. Module-specific evaluation forms reflect this positive response with 100% of students stating that they would recommend the modules to other students and that the IVI lesson helped them learn the material. Focus group responses and student tracking data reinforced high levels of acceptance, with students reporting they they completed optional modules and that they liked the IVI approach. The high level of student acceptance was related in part to a high correlation of IVI module content with course syllabus and lecture content.

One objective in module development was to accommodate different learner styles. Students who used the IVI modules reported different patterns of use of the learner control options: pacing control, sequence control, content control, and whether to view the materials in groups or individually. Students commented that the modules satisfied a variety of objectives including: as an advance organizer to acquire basic concepts; as a supplement to the lecture; for review; and in some instances as a replacement for lecture. Students strongly supported the use of real pathology images on IVI to supplement text information and/or reinforce learning. Thus different styles of learning and different abilities of students were accommodated by the IVI design and implementation. This was a conscious effort by the instructional designers.

The attainment of higher level learning is a continuous goal in medical education. Students reported that when modules were viewed prior to class, the time spent in lecture was used to synthesize information rather than merely obtain facts. Students expressed approval for using the case studies to attain higher level course objectives, e.g., to practice clinical problem solving based on patient history, integrate and apply basic concepts and principles, and integrate and synthesize previously learned material.

In summary, the multiple methods approach used in this study generated a body of relevant learner response data consistent with previous process study outcomes. Students demonstrated a high level of acceptance for the neuropathology IVI materials, different learner styles were accommodated by the design of the modules, and higher level objectives were facilitated by the design and implementation of the IVI modules. Thus, this study supports the increased application of interactive videodisc technology in the medical school curriculum to achieve the recommendations outlined in the GPEP Report. Successful IVI curricular integration must attend to issues that involve careful planning, monitoring, and follow up.

Specific Recommendations

1. Appropriate use of IVI should be integrated within the curriculum, not merely provided as an adjunct to learning.
2. IVI material should relate to content on exams and should incorporate feedback to the student.
3. IVI modules should incorporate learner control options that accommodate various learner styles.
4. Initial exposure to IVI modules should be strongly encouraged or required.
5. Group interactions (2-3 students/group) should be facilitated.
6. Students' perspectives on instructional issues should be solicited in order to design IVI units and plan implementation strategies to best meet the needs of the target student population.

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References

1. Muller, S. (Chairman). Physicians for the Twenty First Century; Report of the Project Panel on the General Professional Education of the Physician and College Preparation for Medicine. J. Med. Educ. 59, Part 2 (November 1984).
2. Borek, Deborah. Unchanging Dilemmas in American Medical Education. Acad. Med. 64 (1989): 240-244.
3. Piemme, T. E. Computer-assisted Learning and Evaluation in Medicine. J.A.M.A. 260 (1988): 367-372.
4. Nolte, J., Eller, P., Trynda, R. S. Stalking the Wild Asparagyrus: Learning Neuroanatomy Using an Interactive Videodisc System. In Research in Medical Education: 1987. Proceedings of the Twenty-Sixth Annual Conference, D. Dabney, compiler, pp. 193-196. Washington, D.C.: Association of American Medical Colleges, 1987.
5. Woods, J. W., Jones, R. R., Schoultz, T. W., Kuenz, M., Moore, R. L. Teaching Pathology in the 21st Century. Arch. Pathol. Lab. Med. 112 (1988): 852-856.
6. Xakellis, G., Gjerde, C. Evaluation by Second-Year Medical Students of Their Computer-Aided Instruction. Acad. Med. 65 (1990): 23-26.

7. Kramer, A. M., Polan, H. J. Uses and Advantages of Interactive Video in Medical Training. J. Med. Educ. 63 (1988): 643-644.
8. Jones, R.R., Schoultz, T.W. Teaching Pathology in the 21st Century: Assessment of Required Student Use of Interactive Videodiscs Designed to Teach Basic Pathology. Human Pathol. 21 (1990): 6-10.
9. Lovell, K., Haf, J., Hodgins, M., Development of Neuropathology Interactive Videodisc Instructional Units. Teaching and Learning in Medicine. 3 (1991): 156-158.
10. Hagler, P., Knowlton, J. Invalid Implicit Assumption in CBI Comparison Research. J. Compt.-Based Instr. 14 (Summer 1987): 84-88.
11. Patton, Michael Q. How to Use Qualitative Methods in Evaluation. Newberry Park, California: Sage Publications, 1987, p. 18.
12. Reeves, T. C. Research and Evaluation Models for the Study of Interactive Video. J. Compt.-Based Instr. 13 (Autumn 1986): 102-106.
13. Slee, E. J. A Review of the Research on Interactive Video. Paper presented at the Association for Educational Communications and Technology Annual Meeting, Dallas, Texas, February 1989.